Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

**Polarization and Pumping Intensity Effects on the Energy Transfer Rate in Quantum Dots** AMEENAH N. AL-AHMADI, SERGIO E. ULLOA, Department of Physics and Astronomy, Ohio University, Athens, OH — We study the dependence of the excitation transfer rate between coupled quantum dots (QDs) on the polarization and the intensity of the exciting light. We use the density matrix to study the dynamics of the luminescence polarization of the QDs [1]. We consider a detailed description of the band edge fine structure of the exciton in the QDs based on an effective mass description with eight exciton levels [2]. The QDs are coupled via the dipole-dipole Forster-like interaction with realistic, experiment-relevant parameters. We investigate the dependence of the luminescence polarization on the polarization of the exciting light and how such measurement give us information about the angular orientation of the excited dipole in the donor dot and the transferred dipole in the acceptor dot. We also study the dynamics of the QD system in the case of multiple-excitons, obtained by increasing the intensity of the exciting light. In this case, the coupling between the QDs includes all the possible interactions between the excitons. The exchange interactions are found to strongly influence the energy transfer rate and affect the resulting polarization. Supported by The Indiana $21^{st}$ Century Research and Technology Fund. [1] A. N. Al-Ahmadi and S. E. Ulloa, Phys. Rev. B **70**, 201302(R) (2004). [2] Al. L. Efros and M. Rosen, Annu. Rev. Mater. Sci. **30**, 475 (2000). Al. L. Efros, phys.rev. B 46, 7448 (1991).

Sergio E. Ulloa
Ohio University

Date submitted: 22 Dec 2004 Electronic form version 1.4